A NEW PROJECT MANAGEMENT METHOD FOR IT INFRASTRUCTURAL TENDERS IN THE EU

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Abstract

Nowadays we would like to find a new consistent management method, which can be used as an effective tool by the EU managers to manage and control the EU IT infrastructure tenders. The managers have to plan and implement projects according to stakeholders' expectations and in the possible most efficient way both in terms of costs and time. At the first I would like to introduce two project management methods, financed and organized by the EU and the US government. These organizations define the project management method. These methods are sustainable and transparent. The Project Cycling Management has to be applied to manage every EU project. The Earned Value Project Management has to be applied to manage every US government supported project. The new method is a combination of both.

1. Introduction

Project management is of the same age as early civilizations. In the Roman Empire the good architects applied the planning and organizing methods. Project management is the discipline of planning, organizing, and managing resources to bring about the successful completion of specific project goals and objectives. As a discipline, Project Management developed from different fields of applications – among others – including construction, engineering and defense. Two forefathers of project management are Henry Gantt, called the father of planning and control techniques, who is famous for his 'Gantt chart' as a project management tool; and Henri Fayola for his creation of the 5 management functions, which form the basis for the body of knowledge associated with project and program management. Frederick Winslow Taylor was the founder of scientific management theory. His work is the forerunner to modern project management tools including work breakdown structure (WBS) and resource allocation (Fleming, Koppelman, 2000).

The 1950s marked the beginning of the modern Project Management era. Project management was formally recognized as a distinct discipline arising from the management discipline. Again, in the United States, prior to the 1950s, projects were managed on an ad hoc basis using mostly Gantt charts and informal techniques and tools. At that time, two mathematical project-scheduling models were developed. The 'Critical Path Method' (CPM) developed in a joint venture by both DuPont Corporation and Remington Rand Corporation for managing plant maintenance projects. The other model is the 'Program Evaluation and Review Technique' or PERT, developed by Booz-Allen & Hamilton as part of the United States Navy's (in conjunction with the Lockheed Corporation) Polaris missile submarine program. These mathematical techniques quickly spread into many private enterprises.

One of my purposes with this essay is introducing two up-to-date project management methods and building up a new one from them. The first is the Project Cycling Manage-

ment (PCM) method. This method has to be applied to manage every EU project. In the case of PCM the cycle starts with the identification of an idea and continues with developing that idea into a working plan that can be implemented and evaluated. Ideas are identified in the context of an agreed strategy. Financing must be added to the project plan. After the project implementation we evaluate and audit the results. We utilize experiences in the next cycles. This is the cycle method. This method is the main character of PCM. Controlling, monitoring and evaluation are parts of PCM. In PCM one of the main questions is defining the strategy. EU projects have the overall goal of making the European Union competitive in the world economy. The fulfillment of this basic strategic goal defines the success of the project. In 1992 the European Commission (EC) adopted 'Project Cycle Management' (PCM) as its primary set of project design and management tools (based on the Logical Framework Approach), and a first PCM manual was produced in 1993. The manual was subsequently updated in 2001, shortly after the publication of the EC's most recent Development Policy document (April 2000). A decision was made in early 2003 to update the PCM manual again (now referred to as the PCM 'Guidelines') as a result of which the experiences gained through implementing the 'new' development policy have been incorporated. Among others, there have been issues addressed, such as the ones that rose by the ongoing international debate on aid effectiveness, and feedback from participants attending PCM training. These are the aspects being relevant from the point of view of this study as well. These new Guidelines have been prepared to support ongoing improvements in the quality of EC development assistance. Quality is defined primarily by the relevance, feasibility and effectiveness of the programs and projects supported with EC funds, including how well they are managed.

The other method is the 'Earned Value Management' (EVM). This method is applied in the USA. We have to use EVM in government supported projects. In 1998 EVM criteria were accepted as an American National Standards Institute/Electronic Industry Association standard, called ANSI/EIA 748. Project Management Institute in Boston worked out EVM techniques. The method contains a lot of useful tools and indicators. These indicators facilitate managing projects. These indicators help us to evaluate projects and predict the future of a project. The advantages of both (PCM and EVM) methods can be applied to all projects of any size or complexity. We can use them in every case independently of industry or size. In my essay I propose to use EVM tools as indicators in PCM. In this way we can control and evaluate the projects on schedule. In this essay I propose to use the indicators of EVM with PCM in case of EU projects. It is important because the EU controller can determine how successful the project is.

2. Earned Value Project Management

In the first part of the essay I introduce the Earned Value Project Management. The base of the method is the earned value. The earned value is the value of the completed work. It is not about cost or money; it is the value of the work and this value is expressed in dollar (or euro or forints). Through the entire life cycle of the project we monitor the earned value and compare it with the planned value.

We compare the actual cost with the earned value too. Minimum quarterly we calculate the indicators and based on them we can re-plan the project. The history of EVM started in 1930s when the industries in the USA developed fast and electronic and oil industries started great high-technology projects. The earned value concept originally came from the

industrial engineers working in the early American factories. After the general depression they understood that they had to measure the efficiency of projects, otherwise sources of investment were wasted. The newer history started in1996 on the 27-th seminar of Project Management Institute. It was held in Boston. They declared that the Earned Value Management applied to every project is independent of size or industry. The same year they declared that in government supported projects the Budgeted Costs for Work Scheduled (BCWS) and the Budgeted Costs for Work Performed (BCWP) methods had to be applied. These methods are based on Earned Value Project management method. The EVM technique can be applied in case of multi-billion dollar huge high technology projects and only some hundred thousand-dollar software projects, too. EVM is a methodology used to measure and communicate the real physical progress of a project taking into account the work completed, the time taken and the cost incurred to complete that work. Earned value helps evaluate and control project risks by measuring project progress in monetary terms. Some famous firms apply EVM techniques in their projects (for example GE, GM, Microsoft, etc).

Henceforth the fundamental conception of EVM is introduced:

The fundamental conception is as follows: we measure and assess the earned value at important points of the timescale of the project, for example on a quarterly basis. At first, we compare the earned value with the actual costs; then we compare the planned value of the completed work at this point of time. We define the cost performance indicator CPI and the schedule performance indicator SPI.

Let us see it on a simplified example:

We have 1 million dollar/year for a project. In the first quarter we will spend 300 thousand dollars according to forecast. After the first quarter we make the project status review. We show in the figure a three-dimensional model. Earned value is the third dimension, the first is the time and the second is the cost.

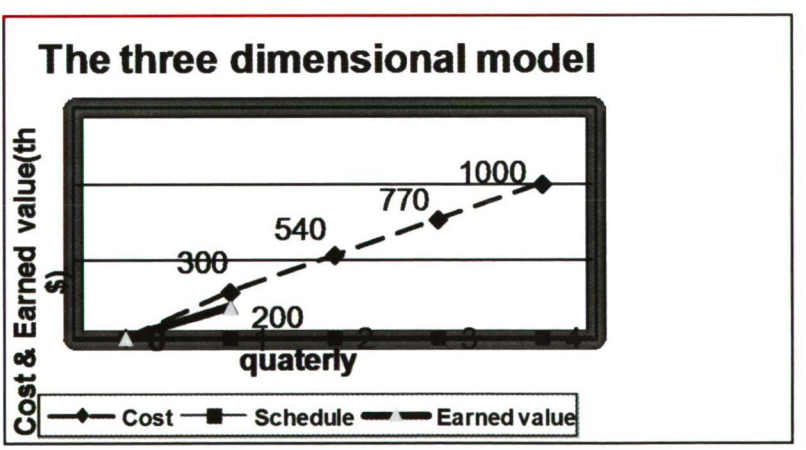
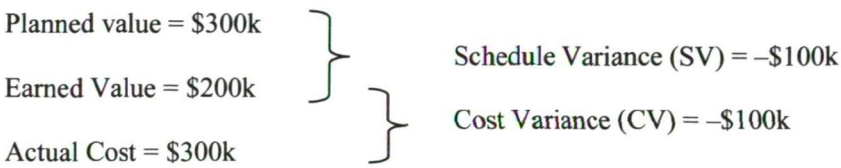


Figure 1. **Three-dimensional model**
(*Source:* Gönczi: Compare the Earned Value Management with the Project Cycling Management 2009)

According to our example, at the end of the first quarter the value of the completed work amounts to 200 thousand dollars. This is the earned value. The actual costs amount to 300 thousand dollars. The value earned for the work performed compared with the actual cost incurred for the work performed (taken directly from the contractor's accounting

systems), provides an objective measure of cost efficiency. On the other hand comparing earned value with the planned value measures the dollar value of work accomplished versus the dollar value of work planned. Any difference is called a schedule variance.



Performance Indices: Schedule Performance Index and Cost Performance Index give indications of the health of the project. Is the project on time, in budget or not? Schedule Performance Index is the ratio of Earned Value and Planned Value of completed works. A SPI < 1 is not good. SPI = Earned Value / Planned value in our case is SPI = 0, 67.

Cost Performance Index is the ratio of Earned Value and the actual costs of completed works. A CPI < 1 is not good. CPI = Earned Value / Actual Cost in our case is CPI = 0, 67.

Now, I introduce the Earned Value concept in nutshell.

Earned Value Management (EVM) is a program management technique that integrates technical performance requirements, resource planning, with schedules, while taking risk into consideration. The Control Account Plan (CAP) is containing these important characteristics of the project. CAP is built by three main points (Mullany, 2011):

1. Technical performances
   At first we determine the technical arrangement of the project. It is containing the Work Breakdown (WBS) Structure and the Organizing Breakdown Structure (OBS) and determines the main responsibilities (K. H. Pries, 2010).
2. Budget
   Now we have to determine the budget of project.
3 Schedule.

The CPI and SPI are measured periodically. In this way we (can) define new indicators, too. These are CPI (p) and SPI (p).

When we plan a project we have to answer six questions: What?, Why?, When?, How?, Where?, Who? (Mullany, 2011)

But in case of EVM the Project Management Institute has defined the project planning process as a ten-step iterative effort, consisting of the followings:

- Define the project scope and identify specific tasks with the use of a WBS.
- Assign responsibility for performance of each of these specific tasks.
- Identify the interfaces between tasks.
- Identify the key project milestones.
- Prepare the master schedule.
- Prepare the top budget.
- Prepare detailed task schedules.
- Prepare detailed task budgets.
- Integrate the task schedules and budgets with the project master schedule and top budget.
- Set up the project files.

Earned Value requires a special scheduling system. There area the next steps required:

- Schedule the authorized work in a manner that describes the sequence of work and identifies the significant task interdependencies required to meet the requirements of the program.

- Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.
- Identify at least monthly, the significant differences between both planned and actual schedule performance, and we need answers to these question:

What work is scheduled to have been completed?

- What was the cost estimate for the work scheduled?
- What work has been accomplished?
- What was the cost estimate of completed work?
- What have been our costs?
- What are the variances?

Earned Value Management requires the synchronization of the planned value with the earned value in order to isolate any planned Schedule Variance (SV). A negative earned value SV simply indicates to the project that it is failing behind its scheduled work. The EVM requires monitoring of project performances based on the Master Schedule Plan vertically and we need to establish the main responsibilities horizontally, too.

Finally, we can make the EVM Performance Report based on key data elements of CPI and SPI. Earned Value Management helps Project managers to measure project performance. It is a systematic project management process used to find variances in projects based on the comparison of worked performed and work planned. EVM is used in the cost and schedule control and can be very useful in project forecasting.

3. Project Cycle Management

In the second part of my essay I introduce the Project Cycle Management (henceforth PCM). The PCM is identified in the context of an agreed strategy.

The European Committee requires applying the 3P+1T concept to EU supported projects. Politics → Program → Project → Tender (EU Commission: Project Cycle Management Guidelines 2004).

PCM was introduced by the European Commission in the early 1990's to improve the quality of project design and management and thereby to improve aid effectiveness. PCM is developed out of an analysis of the effectiveness of development aid undertaken by the OECD Development Assistance Committee during the late 1980's. PCM is based on the cycle theory. It contains the following processes: Problem identification → Workout strategy, planning → Workout program → Executing, Monitoring → Evaluation, Correction. (EU Commission: Project Cycle Management Guidelines 2004).

The details of what occurs during each phase differ between institution, reflecting differences in procedures. However, within all instructions the cycle shares three common themes:

- The cycle defines the key decisions, information requirements and responsibilities at each phase.
- The phases in the cycle are progressive – each phase needs to be completed for the next to be tackled with success.
- The cycle draws on evaluation to build experience from existing projects into the design of future programs and projects.

Let us see my challenges:

The communications lines are not high speed enough among universities. We need 10 Gigabit/s or 40 Gigabit/s speed fiber data communications lines. We have to build it up.

In PCM the first is the strategic analysis. Three steps need to be made:

1. SWOT analysis
   This method is about 50 years old. We need to fill the next table:

***Table 1.* SWOT analysis**
(*Source:* Gönczi: 2011)

Strengths: Don't start from zero. We have old infrastructure too; use it.	**Weaknesses:** The business is not profitable for us.
Opportunities: Universities demand other services.	**Threats:** Other providers will be cheaper.

2. Problem tree defining. The problem analysis involves the identification of major problems faced by beneficiaries and the development of a problem tree to establish causes and effects. The steps are:
   Identification of the problems
   Identification of the main problem and Cause – Effect identification
   Drawing of the problem tree
   Analyze cause – effects
   Effect: No Research and development are in place in super highway communications among universities
   Causes: There are no optical fibers; there are no IT devices; there is no high speed communication; there is no data communication.

3. Objectives tree. A problem tree presents negative aspects of an existing situation; an analysis of objectives presents the positive aspects of desired future situation. This involves the reformulation of problems into objectives; the "objective tree" conceptualizes the mirror image of the problem tree. The cause and effect relationships are "means and end" relationships.
   Forecast; How to solve the problem?
   Cause – effects change to means – ends
   Tools – results
   Ends: Let the research and developing teamwork among the universities in a super high way communications lines are.
   Means: build up optical fiber networks; install IT devices; install DWDM 100Gbs devices.

The Logical Framework Approach (LFA) was developed in the late 1960's to assist the US Agency of International Development to improve its project planning and evaluation system. It was designed to address three basic concerns, namely that: Planning was too vague, without clearly defined objectives that could be used to monitor and evaluate the success (or failure) of a project. Management responsibilities were unclear, and, Evaluation was often an adversarial process, because there was no common agreement as to what the project was really trying to achieve. The LFA has since been adopted as a project planning and management tool by most multilateral and bilateral development agencies. The EC has required the use of LFA as part of its Project Cycle Management system since 1993, and it provides a core set of tools with which to undertake assessments of project quality. Over time, different agencies have modified the formats, terminology and tools of the LFA; however the basic analytical principles have remained the same. Knowledge of the principles of LFA is therefore essential for all staff involved in the design and delivery of EC development assistance (EU Guidelines 2005).

In this way we set the overall objective, the project purpose and the results and last but not least the activities too.

- Now we determine beneficiaries and stakeholders. During the formulation phase, project ideas can then be fully developed in the knowledge that they are based on real beneficiary needs and are sufficiently 'owned' by the main stakeholders.
- In the planning phase the log frame and its output is Log frame Matrix LFA (unclear, incomplete sentence!!). The log frame itself consists of a table, or matrix, which has four columns and (in its most basic form) four rows. The vertical logic identifies what the project intends to do, clarifies the causal relationships and specifies the important assumptions and uncertainties beyond the project manager's control. The horizontal logic relates to the measurement of the effects of, and resources used by, the project through the specification of key indicators if measurement, and the means by which the measurement will be verified.

The Log Frame Matrix contains the controllability and efficient-ability of the project. The verifiable indicators are very important. I propose to use the EVM indicators CPI, SPI too in PCM. These indicators would have an important role in the controlling, monitoring and evaluating of the project and the data collection, too. We would intervene in the project based on CPI and SPI if it is necessary. We could care of assumption of the project if we apply the EVM technique.

4. The new method and its applications

The challenge was: having twenty universities networked with each other and the network center in the capital of Hungary. We had to build up a high speed infrastructural optical network among the universities.

We solved project management with Microsoft Project 2003. It has an „Earned Value" option too. Due to planning we had to obtain lots of official permits. For the most of the universities the end dates were very strict. We had to build the system up for them in half a year. Now, I introduce how these tasks could be solved by the project.

First of all, we set up a project team. The team members were experts from technical, finance and sales fields. The team members were in a non-stop contact with each other via electronic communication lines.

The first condition was the backbone communications solved by Electricity Power Company. We had to connect to this backbone network.

The project management activities included:

- flow-charts
- network planning
- performance evaluation
- progress checkups
- resource management
- application of web information and a reporting system
- contract management: we had to enter into contract with the owner of backbone networks
- claim management
- cost planning: we have only predetermined costs
- schedule: we have to build the network half a year; we use MS Project 2003
- quality management: on completion of networks we have to control the predetermined quality

- documentation management: we have to solve inventory of all networks
- risk management: a lot of events we have to make amends for digging above the planned cost; we have to compromise with natural park.
- configuration and change management
- Re-planning helps with to calculate earned values.

We applied the multi-task management tool. The endpoints were in five regions of the country: Western, Eastern, Southern, Northern and Middle Hungary. Each region had its own Project Manager. Every manager had to report to the Center in all time. Every problem has been resolved on time and when it was required we re-planned the project in terms of its costs and schedule, too. We calculated the Cost Performance Indexes and the Schedule Performance Indexes and re-planned the projects accordingly.

We have accomplished the project on time and collected a lot of experiences.

Let us pay more attention to the coordination of work force management; quality assurance issues and subscriber demands and better coordination of subcontractors.

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